

What is Claimed is:

1. An antenna duplexer comprising:

an antenna terminal;

a transmitting phase-shift circuit, one side of which is connected to said antenna terminal;

a receiving phase-shift circuit, one side of which is connected to said antenna terminal;

a transmitting filter connected to the other side of said transmitting phase-shift circuit and a transmitting terminal;
and

a receiving filter connected to the other side of said receiving phase-shift circuit and a receiving terminal;

wherein said transmitting filter and/or said receiving filter is a composite filter, and said composite filter attains a characteristic having an attenuation pole at simultaneous transmission and reception time when transmission and reception are simultaneously performed, and controls respective impedances by said transmitting phase-shift circuit and said receiving phase-shift circuit to operate as a sharing unit and attains a characteristic where said attenuation pole is removed at non simultaneous transmission and reception time when transmission and reception are not performed simultaneously.

2. An antenna duplexer comprising:

an antenna terminal;

an antenna switch connected to said antenna terminal;

a transmitting phase-shift circuit connected to the one side terminal of said antenna switch;

a receiving phase-shift circuit connected to the other side terminal of said antenna switch;

a transmitting filter connected to the other side of said transmitting phase-shift circuit and a transmitting terminal; and

a receiving filter connected to the other side of said receiving phase-shift circuit and a receiving terminal;

wherein, at a non-simultaneous transmission and reception time when transmission and reception are not performed simultaneously, said antenna switch performs an operation of switching over to time division of the operation to electrically connect said antenna terminal to said one side terminal and the operation to electrically connect said antenna terminal to said other side terminal, respectively,

and wherein, at a simultaneous transmission and reception time when transmission and reception are performed simultaneously, said antenna switch performs the operation to connect said antenna terminal to said one side terminal and said other side terminal simultaneously.

3. The antenna duplexer according to claim 2, wherein said transmitting filter is a composite filter,

and wherein said composite filter attains a characteristic having the attenuation pole at said simultaneous transmission and reception time, and controls respective impedances by said transmitting phase-shift circuit and said receiving phase-shift circuit so as to operate as a sharing unit and attains a characteristic where said attenuation pole is removed at non simultaneous transmission and reception time.

4. The antenna duplexer according to any one of claims 1 to 3 comprising a constitution employing a laminated filter which uses a dielectric green sheet,

that said transmitting filter and at least the one side of said receiving filter are formed in said laminated filter, and said switch being mounted on the upper surface of said laminated filter.

5. The antenna duplexer according to any one of claims 1 to 3, wherein said receiving filter is an surface acoustic wave filter.

6. The antenna duplexer according to claim 2 or 3, wherein said receiving filter is the composite filter according to claim 3.

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7. The antenna duplexer according to claim 2 or 3, wherein, at said simultaneous transmission and reception time,

an output level of a transmitting amplifier directly or indirectly connected to said transmitting terminal is raised relative to said non-simultaneous transmission and reception.

8. The antenna duplexer according to claim 7, wherein adjustment to raise the output level of said transmitting amplifier is performed by increasing a power source voltage of said transmitting amplifier.

9. The antenna duplexer according to any of claims 1, 3, 5, 6, wherein said composite filter has an input terminal, an output terminal, at least one transmitting circuit and at least not less than one switching notch filter,

said transmitting circuit is electrically connected between said input terminal and said output terminal,

said switching notch filter is connected to at least either one of the input side and output side of said transmitting circuit,

said switching notch filter has at least one switch and at least one series resonance circuit,

one end of said switch is connected between said input terminal and said output terminal,

the other end of said switch is connected to one end of said series resonance circuit, and

said switch has a control terminal to switch ON/OFF.

10. The antenna duplexer according to claim 9, wherein, when said switch is in an ON state, a passing characteristic from said input terminal to said output terminal is a characteristic superposed with the characteristic having the attenuation pole formed by the characteristic of said transmitting circuit and said series resonance circuit of said switching notch filter,

and wherein, when said switch is in an OFF state, a passing characteristic from said input terminal to said output terminal substantially becomes a characteristic which is possessed by the transmitting circuit.

11. The antenna duplexer according to claim 10, wherein said transmitting circuit is constituted by a circuit having a filter function.

12. The antenna duplexer according to claim 9, wherein said transmitting circuit is constituted by a serial connection of capacitors.

13. The antenna duplexer according to claim 9, wherein said transmitting circuit is constituted by a strip line.

14. The antenna duplexer according to claim 9, wherein said antenna duplexer has a constitution employing a laminated filter which uses a dielectric green sheet,

said switching notch filter is formed in said laminated filter, and

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said switch is mounted on the upper surface of said laminated filter.

15. The antenna duplexer according to claim 2 or 3, wherein said antenna switch is integrated with another switch connected to said antenna terminal.

16. The antenna duplexer according to claim 9, wherein, at said simultaneous transmission and reception time, by the same control signal, said antenna switch performs an operation to electrically connect said antenna terminal, said one side terminal and said other side terminal of said antenna terminal and an operation to turn ON a switch of the switching notch filter of said composite filter.

17. The antenna duplexer according to claim 9, wherein, at said non-simultaneous transmission and reception time, by the same control signal, said antenna switch performs by time division an operation to handle individually the electrical connection with said one side terminal or said other side terminal from said antenna terminal and an operation to turn OFF a switch of said switching notch filter of said composite filter.

18. The antenna duplexer according to claim 9, wherein, when said switch is turned ON, said series resonance circuit attains a characteristic having the attenuation pole and, when said switch is turned OFF, said series resonance circuit is

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electrically separated in a channel from said input terminal to said output terminal, and the passing characteristic from said input terminal to said output terminal attains a substantially same characteristic as the transmitting circuit.

19. The antenna duplexer according to claim 9, wherein a FET is used for said switch.

20. The antenna duplexer according to claim 9, wherein a pin diode is used for said switch.

21. The antenna duplexer according to claim 9, wherein a pin diode and a quarter wave length line are used for said switch.

22. The antenna duplexer according to claim 9, wherein said series resonance circuit has a constitution in which a capacitor and a resonator are connected in series.

23. The antenna duplexer according to claim 9, wherein said series resonance circuit has a constitution in which an inductor and the resonator are connected in series.

24. The antenna duplexer according to claim 9, wherein said series resonance circuit has a constitution in which a circuit consisting of a capacitor and inductor connected in parallel and the resonator connected are connected in series.

25. The antenna duplexer according to any of claims 1, 3, 5, 6, wherein said composite filter has an input terminal,

an output terminal, at least one transmitting circuit and at least not less than one switching notch filter,

said transmitting circuit is electrically connected between said input terminal and said output terminal,

said switching notch filter is connected to at least either one of the input side and output side of said transmitting circuit,

said switching notch filter has at least one switch and at least one surface acoustic wave filter,

one end of said switch is connected between said input terminal and said output terminal,

the other end of said switch is connected to one end of said surface acoustic wave filter, and

said switch has a control terminal to switch ON/OFF.

26. The antenna duplexer according to claim 9, wherein said composite filter has an input terminal, an output terminal, and more than at least one switching notch filter connected to said input terminal and said output terminal,

said switching notch filter has two switches connected said input terminal and said output terminal, respectively,

the notch filter and the transmitting circuit have a predetermined characteristic are connected in parallel between said two switches, and

said notch filter and said transmitting circuit have a predetermined characteristic being able to be switched by said switch.

27. The antenna duplexer according to claim 26, wherein said notch filter consists of a parallel resonant circuit.

28. The antenna duplexer according to claim 26, wherein said notch filter is an surface acoustic wave filter.

29. A mobile communication device corresponding to simultaneous transmission and reception which simultaneously performs transmission and reception and non simultaneous transmission and reception which does not simultaneously perform transmission and reception comprising:

an antenna connection circuit; and

wherein the antenna duplexer according to claim 1 is used for said antenna connection circuit.

30. The mobile communication device corresponding to simultaneous transmission and reception which simultaneously performs transmission and reception and non-simultaneous transmission and reception which does not simultaneously perform transmission and reception,

wherein, at said non-simultaneous transmission and reception time, the antenna connection circuit is provided which operates as a transmit-receive selector switch having filters at a transmitting side and a receiving side and, at

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the simultaneous transmission and reception time, operates as the sharing unit, and

wherein the antenna duplexer according to claim 2 is used for said antenna connection circuit.

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